

THE GENUS *PLATANThERA* (ORCHIDACEAE) IN MISSISSIPPI

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ABSTRACT

Platanthera Rich. is a genus in the Orchidaceae, subfamily Orchidoideae, tribe Orchideae, subtribe Orchidinae. There are approximately 200 species distributed across the Northern Hemisphere in boreal and temperate regions with centers of diversity in North America and East Asia. Of these taxa, 10 *Platanthera* species have been documented from Mississippi and are as follows: *P. ciliaris*, *P. clavellata*, *P. conspicua*, *P. cristata*, *P. flava*, *P. integra*, *P. integrilabia*, *P. lacera*, *P. nivea*, and *P. peramoena*. These inhabit a variety of wetland habitats, and some of them are indicators of unusual plant community types. Several of the species listed are of conservation concern. During July 2009 and July 2010 when plants were at anthesis, 14 trips were made to locate extant populations of *Platanthera* species, record habitat data, and visit the major herbaria in Mississippi. *Platanthera* specimens in the following herbaria were examined: University of Mississippi (MISS), Mississippi State University (MISSA), University of Southern Mississippi (USMS), Delta State University (DSC), Institute for Botanical Exploration (IBE), Mississippi Museum of Natural Science (MMNS), The Crosby Arboretum, and my personal collections. An artificial key and updated information on the distribution and habitats of the native Mississippi species are presented.

RESUMEN

Platanthera Rich. es un género de Orchidaceae, subfamilia Orchidoideae, tribu Orchideae, subtribu Orchidinae. Tiene unas 200 especies distribuidas por el hemisferio norte en las regiones boreales y templadas con centros de diversidad en Norte América y Este de Asia. De estos taxa, 10 especies de *Platanthera* han sido documentadas de Mississippi y son las siguientes: *P. ciliaris*, *P. clavellata*, *P. conspicua*, *P. cristata*, *P. flava*, *P. integra*, *P. integrilabia*, *P. lacera*, *P. nivea*, y *P. peramoena*. Viven en una variedad de hábitats húmedos, y algunas de ellas son Indicadores de tipos de comunidades poco frecuentes. Varias de las especies están en las listas de preocupación para la conservación. Durante julio de 2009 y julio de 2010 cuando las plantas estaban en anthesis, se realizaron 14 viajes para localizar poblaciones de especies de *Platanthera*, tomar datos del hábitat, y visitar los mayores herbarios de Mississippi. Se examinaron los especímenes de *Platanthera* en los siguientes herbarios: University of Mississippi (MISS), Mississippi State University (MISSA), University of Southern Mississippi (USMS), Delta State University (DSC), Institute for Botanical Exploration (IBE), Mississippi Museum of Natural Science (MMNS), The Crosby Arboretum, y mis colecciones personales. Se presenta una clave artificial e información puesta al día de la distribución y hábitats de las especies nativas de Mississippi.

INTRODUCTION

The Orchidaceae is one of the largest families of flowering plants (Correll 1978), with approximately 20,000 species; some estimates are as high as 35,000 species (Dressler 1981, 1993). The family is most speciose in the tropics, and the majority of taxa in this family exist as epiphytes. *Platanthera* Rich. is a genus of approximately 200 terrestrial species distributed primarily in the circumboreal and temperate zones in the Northern Hemisphere (Sheviak 2002). *Platanthera* species are particularly well-represented in North America and East Asia. Within the orchid family, *Platanthera* is classified in subfamily Orchidoideae, tribe Orchideae, subtribe Orchidinae. Species of *Platanthera* commonly have either tuberous or slender, fleshy roots, usually basal, lanceolate to oblanceolate leaves that become reduced to bracts farther up the inflorescence axes, and spicate or racemose inflorescences. Flower color ranges from white to greenish to shades of orange and purple. Lips and other petals of flowers are often fringed, hence the common name fringed orchids, although they may be entire. Nectar spurs are at flower bases. Among the species in the genus, pollination modes range from self-pollination in *P. clavellata* (Luer 1975), to insect pollination involving butterflies in *P. ciliaris*, and *P. integrilabia* (Zettler et al. 1996), butterflies, moths, and bees in *P. blephariglottis* (Smith & Snow 1976), day-flying sphinx moths in *P. lacera* (Yatskievych 1999) and *P. peramoena* (Hapeman & Inoue 1997), bumble bees in *P. cristata* and *P. integra*, and even mosquitoes in *P. flava* (Luer 1975). Reproductive biology greatly influences phylogenetic relationships within *Platanthera* (Bateman et al. 2009; Hapeman & Inoue 1997).

Platanthera species native to Mississippi occur in a variety of wetland habitats, and some of them are indicators of unusual plant community types. Wetland types include dense cypress—hardwood swamp forests, spring branches and adjacent seepage slopes, bottomland hardwood/wet meadow ecotones, shrub and hillside *Sphagnum* bogs, bay swamps and pitcher plant savannas, mesic field/woodland ecotones, and open, upland pine woods with perched water tables. Disturbed habitats include highway medians, powerline rights-of-way, and gas pipelines running through wetlands. Regarding the latter, the periodic mowing/bush hogging likely promotes growth of fire-adapted *Platanthera* species needing high light intensities by removing encroaching trees and shrubs. These practices benefit the orchids if done at the right time of year, if herbicides are not sprayed, and if the ground is not mechanically disturbed. Several *Platanthera* species are of conservation concern and are tracked by the Mississippi Natural Heritage Program (2006); they are as follows: *P. conspicua* (= *P. blephariglottis* var. *conspicua*) (S2), *P. cristata* (S3), *P. integra* (S3), *P. integrilabia* (S1), *P. lacera* (S1S2), and *P. peramoena* (S2S3). Of these, two species have moderate to high priority global conservation rankings: *P. integra* (G3G4) and *P. integrilabia* (G2G3). This study was conducted because a floristic manual for Mississippi does not exist. Therefore, treatments of genera and families are needed as published journal articles at this time.

METHODS

During July, 2009 and July, 2010, when plants were at anthesis, 14 trips were made to locate extant populations of *Platanthera* species, record habitat data, and visit the major herbaria in Mississippi. These excursions were made to characterize specific habitat requirements of *Platanthera* species among the different physiographic regions in Mississippi. Herbarium visits were conducted to accurately determine county-by-county distribution among the physiographic regions in Mississippi and to make morphological measurements. *Platanthera* specimens in the following herbaria were examined: University of Mississippi (MISS), Mississippi State University (MISSA), University of Southern Mississippi (USMS), Delta State University (DSC), Institute for Botanical Exploration (IBE), Mississippi Museum of Natural Science (MMNS), The Crosby Arboretum, and my personal collections. Representative specimens examined are listed at the end of each treatment for the species in Mississippi. Material of *P. flava* deposited in MISS was on loan to Arkansas Tech at the time of this study. The following sources relevant for the flora of the southeastern United States were considered for synonymy in this paper: Clewell (1985), Godfrey and Wooten (1979), Luer (1972, 1975), Radford et al. (1968), Sheviak (2002), The International Plant Names Index (2012), Weakley (2012), Wofford (1989), and Wunderlin (1998).

RESULTS AND DISCUSSION

Ten species of *Platanthera* are known to occur in Mississippi, a state with ten physiographic regions (Lowe 1921; MARIS 2013; USGS 2013) (Fig. 1). They are as follows: *P. ciliaris*, *P. clavellata*, *P. conspicua*, *P. cristata*, *P. flava*, *P. integra*, *P. integrilabia*, *P. lacera*, *P. nivea*, and *P. peramoena*. Distribution of each taxon in Mississippi accompanies photographic images of each species and is based on herbarium vouchers examined and the USDA Plants Database (2013). Of the native *Platanthera* species, *P. ciliaris*, *P. clavellata*, and *P. flava* are the most widely distributed in the state. *Platanthera clavellata* and *P. flava* occur in practically every physiographic region, with the exception of the Black Belt and Jackson Prairies, and the Yazoo-Mississippi Delta, although *P. flava* is known from swamp and bottomland hardwood forests at the easternmost edge of the latter. While sometimes frequent in wetland areas with acidic soils in the Longleaf Pine Belt and Coastal Pine Meadows, *P. ciliaris* appears to be absent from circumneutral, calcareous, and heavy clay soils characteristic of the Pontotoc Ridge, Black Belt and Jackson Prairies, Loess Bluffs, and Yazoo-Mississippi Delta. Despite having a broad distribution in Mississippi similar to that of *P. ciliaris*, *P. cristata* is generally a rare species that inhabits shrub bogs, spring branch habitats with a partially open canopy, and moist to wet flatwoods.

Species of *Platanthera* primarily recorded from northern Mississippi include *P. integrilabia*, *P. lacera*, and *P. peramoena*. Both of the latter taxa sporadically occur. Most *P. lacera* populations are documented from moist meadows and woodland borders in the North Central Plateau, with outlying populations in the Tennessee River Hills and Longleaf Pine Belt. The majority of *P. peramoena* records are from bottomland hardwood forests and adjacent meadows in river and creek floodplains in the North Central Plateau and areas transitional to the

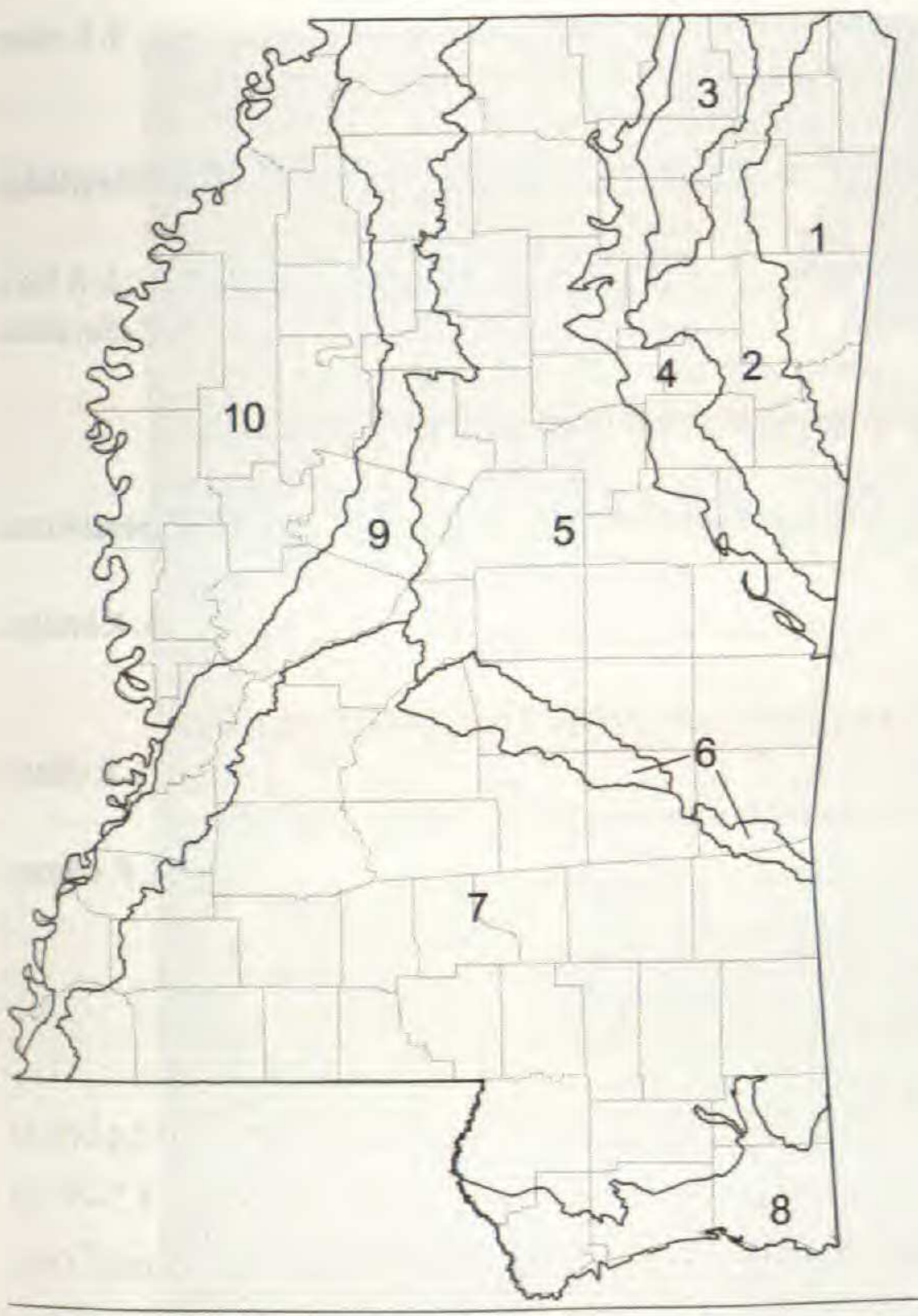


FIG. 1. Physiographic regions of Mississippi (adapted from MARIS 2013 and USGS 2013) (1 = Tennessee River Hills; 2 = Black Belt Prairie; 3 = Pontotoc Ridge; 4 = Interior Flatwoods; 5 = North Central Plateau; 6 = Jackson Prairie; 7 = Longleaf Pine Belt; 8 = Coastal Pine Meadows; 9 = Loess Bluffs; 10 = Yazoo-Mississippi Delta).

Loess Bluffs; populations are also supported in the Tennessee River Hills and Pontotoc Ridge in the northeastern corner of the state and in the Jackson Prairie and sites transitional to the Longleaf Pine Belt in central Mississippi, which are among the southernmost populations in the United States. *Platanthera integrilabia* is the rarest and most narrowly distributed of the fringed orchids in Mississippi and is only known from shaded wetland habitats of the Tennessee River Hills.

Platanthera conspicua, *P. integra*, and *P. nivea* are all characteristic of open pitcher plant bogs and savannas in the Longleaf Pine Belt and Coastal Pine Meadows of southern Mississippi. However, *P. nivea* is the only taxon not considered rare in the region; and it can even occur at sites transitional to sandhill habitats and infrequently in highly disturbed areas such as highway medians and rights-of-way. All three orchids typically inhabit fire-prone wetland sites with soils deficient in nitrogen in association with species such as the following: *Aletris lutea*, *Aristida beyrichiana*, *Carphephorus pseudo-liatris*, *Eriocaulon compressum*, *E. decangulare*, *Lachnanthes caroliniana*, *Lilium catesbaei*, *Lophiola aurea*, *Magnolia virginiana*, *Nyssa biflora*, *Persea palustris*, *Pinus elliottii*, *P. palustris*, *Stenanthium densum*, *Stokesia laevis*, *Taxodium ascendens*, *Tofieldia racemosa*, *Zigadenus glaberrimus*, and species of the genera *Cyperus*, *Dicanthelium*, *Drosera*, *Hypericum*,

Ludwigia, *Pinguicula*, *Polygala*, *Rhexia*, *Rhynchospora*, *Sabatia*, *Sarracenia*, *Utricularia*, and *Xyris*. Associated orchids include: *Calopogon barbatus*, *C. multiflorus*, *C. pallidus*, *C. tuberosus*, *Cleistes bifaria*, *Pogonia ophioglossoides*, *Spiranthes longilabris*, and *S. praecox* (Morris 1989).

GENUS DESCRIPTION AND KEY TO THE SPECIES IN MISSISSIPPI

Platanthera Rich., FRINGED ORCHIDS

Glabrous erect perennial herbs with tuberous, fusiform, or occasionally fibrous roots; plants terrestrial in wetland habitats. Leaves simple, alternate, mostly basal, obovate-oblong to linear-lanceolate, persistent, becoming reduced bracts toward the top of the plant. Inflorescence spicate to racemose. Flowers white or greenish to yellow, orange, or purple; sepals free, dorsal sepal erect or forming a hood over the column; lateral sepals spreading or recurved; petals free, simple or bipartite; lip lowermost (uppermost in *P. nivea*), entire, divided, or fringed, base of labellum modified into saccate to filiform nectar spur shorter than or longer than pedicel; column short; stigma with or without papillose processes; anther apical, 2-celled; pollinia 2, attached to partially to fully exposed viscid gland. Fruit a cylindrical to ellipsoid capsule.

An artificial dichotomous key to the ten *Platanthera* species in Mississippi was constructed based on observations of both herbarium specimens and living plants in the field, and it is presented below.

KEY TO PLATANTHERA SPECIES IN MISSISSIPPI

- 1. Perianth white, greenish, or greenish-yellow (if greenish-yellow, then plants with up to four well-developed leaves along one-third to one-half the height of the inflorescence axis and often growing in shaded swamp forests).
 - 2. Lip conspicuously fringed, or lacerate. 3. *P. conspicua*
 - 3. Perianth bright white; plants flowering from late July–September 8. *P. lacera*
 - 3. Perianth greenish to dull greenish-white; plants flowering from May–June
 - 2. Lip without fringe, at most lobed or with small sharp-pointed teeth.

4. Lip uppermost in flowers (flowers not resupinate); plants of open savannas and shrub bogs _____ 9. *P. nivea*
4. Lip lowermost in flowers (flowers at least partially to completely resupinate); plants typically of shaded swamps and bogs.
5. Nectar spur 4–5 cm long _____ 7. *P. integrilabia*
5. Nectar spur up to 1 cm long.
6. Inflorescence with 10–40 loosely arranged flowers in an elongate spike _____ 5. *P. flava*
6. Inflorescence with 3–15 flowers in a short raceme _____ 2. *P. clavellata*
1. Perianth orange (to yellowish-orange) or purple (if yellowish-orange, then plants with usually 2–4 conspicuously keeled leaves along the basal or lower portion of the inflorescence axis and often growing in shrub bogs and open, wet savannas).
7. Perianth purple; plants of alluvial bottomland hardwoods, adjacent ditches, and meadows _____ 10. *P. peramoena*
7. Perianth orange (to yellowish-orange).
8. Lip rounded, without fringe (apex with small irregular teeth) _____ 6. *P. integra*
8. Lip ovate to oblong, conspicuously fringed.
9. Lip oblong, approximately 1 cm long, with ciliate fringe extending another 1 cm; nectar spur 2.0–3.5 cm long (obviously longer than pedicel) _____ 1. *P. ciliaris*
9. Lip ovate, less than 5 mm long, with ciliate fringe extending up to another 5 mm; nectar spur up to 1 cm long _____ 4. *P. cristata*

1. *Platanthera ciliaris* (L.) Lindl. (Figs. 2, 3, 13). YELLOW FRINGED-ORCHID

Habenaria ciliaris (L.) R. Brown, *Orchis ciliaris* L.

Plant erect, often robust, to 100 cm tall. Leaves mostly basal, lanceolate, keeled, reduced and becoming bracts above, 15–30 cm long, 15–30 mm wide. Raceme densely or laxly flowered, bracteate, 5–17 cm long, 4.5–9 cm wide. Flowers 15–25 mm long, yellow-orange to orange; sepals ovate, 7–8 mm long, 6–7 mm wide, dorsal concave, lateral reflexed; petals linear, apex fringed, 5–6 mm long, 1–1.5 mm wide; lip oblong, 10–16 mm long, 6–8 mm wide, conspicuously ciliate-fringed; nectar spur slender, 2–3.5 cm long. Jul–mid-Aug(–early Sep). Open to shaded bogs and seepage slopes, wet fields and savannas, seepy roadcuts and adjacent ditches, and open, upland pine woods. Coastal Pine Meadows, Longleaf Pine Belt, North Central Plateau, Interior Flatwoods, and Tennessee River Hills. Infrequent to occasional (MA to Ont., MI, and IL, s to FL, w to e TX and OK).

Among *Platanthera* species in Mississippi, *P. ciliaris* has the most varied habitat preferences. In southern Mississippi, it frequently occurs in pitcher plant bogs and savannas with the same species listed above for *P. conspicua*, *P. integra*, and *P. nivea*. In Grenada County, located in the north central part of the state, *P. ciliaris* is encountered in boggy springheads with much *Sphagnum* and in adjacent open, sandy seepage areas with the following taxa: *Arnoglossum ovatum*, *Carex atlantica*, *C. crinita*, *C. laevivaginata*, *C. styloflexa*, *Chelone glabra*, *Doellingeria sericocarpoides*, *Drosera brevifolia*, *Eryngium integrifolium*, *Gentiana saponaria*, *Ilex verticillata*, *Impatiens capensis*, *Lobelia cardinalis*, *Lycopodiella appressa*, *Orontium aquaticum*, *Osmunda cinnamomea*, *O. regalis*, *Oxypolis rigidior*, *Persicaria sagittata*, *Photinia pyrifolia*, *Rhexia virginica*, *Rhododendron canescens*, *Rhynchospora glomerata*, *Solidago patula*, *Sphenopholis pennsylvanica*, *Symphotrichum puniceum*, *Vaccinium corymbosum*, *Viburnum nudum*, *Woodwardia areolata*, and *Xyris torta* (Morris 1988). Companion orchid species include *Platanthera clavellata* and *Spiranthes cernua*.

Representative specimens examined: **U.S.A. MISSISSIPPI. Attala Co.:** ca. 3.5 mi SE of intersection of hwy 35 and Natchez Trace Parkway, 32.98278, -89.5583, moist seepage area along pipeline right-of-way, 15 Jul 1991, Wieland 6550 (MMNS). **Grenada Co.:** ca. 2.5 mi NNW of Gore Springs, (T22N, R6E, S12, S2), in springhead bog with much *Sphagnum*, 29 Jul 1985, Morris 405 (mwm, pers. herb. of Michael Wayne Morris). **Hancock Co.:** Hillside Bog Natural Area of the Crosby Arboretum, ecotone of open bog and *Magnolia virginiana*—*Taxodium ascendens*—*Nyssa biflora*, 4 Aug 1986, Morris 2423 (herbarium of the Crosby Arboretum). **Jackson Co.:** ca. 2.0 mi N of Escatawpa on E side of Sarracenia Rd., Mississippi Sandhill Crane National Wildlife Refuge, savanna, frequent, 8 Sept 1983, Norquist 1396 (MMNS). **Monroe Co.:** ca. 1.5 mi N of Hatley Detroit Rd., old mining site, with *Pogonia ophioglossoides*, *Platanthera clavellata*, *Sphagnum*, *Fuirena squarrosa*, *Carex atlantica*, 23 Jul 1993, MacDonald 6459 (MMNS). **Winston Co.:** ca. 2.9 mi N of junction of Hwy, 25 and Hwy, 19, roadside, 2 Aug 1997, MacDonald 10899 (MMNS).

2. *Platanthera clavellata* (Michx.) Luer (Figs. 4, 5, 10). SMALL GREEN WOOD-ORCHID

Habenaria clavellata (Michx.) Spreng., *Orchis clavellata* Michx.

Plant erect, small, to 40 cm tall. Leaves mostly basal, usually one, sometimes two, oblanceolate, reduced and becoming widely spaced bracts above, 8.5–14.5 cm long, 12–28 mm wide. Raceme few- to many-flowered,



FIG. 2. *Platanthera ciliaris*, Jackson County, Mississippi.



FIG. 3. Known distribution of *Platanthera ciliaris* in Mississippi.

2.5–6 cm long, 2–2.8 cm wide. Flowers 4–6 mm long, yellowish white to greenish; sepals ovate, obtuse, 4 mm long, 2.5 mm wide; petals obovate, 5 mm long, 2 mm wide; lip oblong, truncate, apex tridentate, 5–6 mm long, 2.5–3 mm wide; nectar spur slender and broadest distally, 9–14 mm long. Late Jun–early Aug. Shaded, mossy stream banks, springs, bogs, seepage slopes in woods, and swamp forests. Coastal Pine Meadows, Longleaf Pine Belt, North Central Plateau, Loess Bluffs, Interior Flatwoods, Pontotoc Ridge, and Tennessee River Hills. Infrequent to occasional (sometimes locally frequent) (Nfld. to Ont. and MN, s to n FL, w to se OK and e TX).

One of the most common orchid species in Mississippi, *P. clavellata* frequents shaded wetland sites, often rooted in *Sphagnum* in bay swamps and along spring branches in rich deciduous hardwood forests. Many of the same species associated with *P. ciliaris* in northern Mississippi also occur with *P. clavellata*. Additional taxa include: *Chasmanthium laxum*, *Itea virginica*, *Lilium superbum*, *Magnolia virginiana*, *Nyssa biflora*, *Oxydendrum arboreum*, *Persea palustris*, *Thelypteris noveboracensis*, *Toxicodendron vernix*, *Veratrum virginicum*, and *Viburnum dentatum*. Associ-



FIG. 4. *Platanthera clavellata*, Grenada County, Mississippi.

R7E, S5), in a springhead bog with *Arnoglossum ovatum*, *Oxypolis rigidior*, *Solidago patula*, 23 Jul 1986, Morris 2356 (IBE). **Itawamba Co.:** ca. 1 mi N of Fulton, (T9S, R8E, S24, NE4), seepage swamp, with *Magnolia virginiana*, *Toxicodendron vernix*, 3 Aug 1983, Gordon 2921 (MMNS). **Jasper Co.:** 31.9572, -89.2675, (T1N, R13W, S3, SW4), black gum/sweetbay drain, 7 Oct. 2003, Sullivan 03-265 (MMNS). **Marion Co.:** frequent in seepage areas in ravines, beech-magnolia forest, Red Bluff, E side of Pearl River, 27 Jul 1978, Rogers 45328 (MMNS). **Scott Co.:** Roosevelt State Park, 32.3144, -89.6752, sphagnum drain NW of lake, piney woods with gum-bay drains, 29 Jul 2004, Sullivan 04-680 (MMNS).

3. *Platanthera conspicua* (Nash) P.M. Brown (Figs. 6, 7). LARGE WHITE FRINGED-ORCHID

Habenaria conspicua Nash, *Platanthera blephariglottis* (Willd.) Lindl. var. *conspicua* (Nash) Luer

Plant erect, robust, to 100 cm tall. Leaves mostly basal, ovate-lanceolate to linear-lanceolate, reduced and becoming bracts above, 15–21 cm long, 7–23 mm wide. Raceme densely or laxly flowered, bracteate, 7–14 cm long, 4–8 cm wide. Flowers 15–25 mm long, white; sepals ovate, 5–11 mm long, 4–9 mm wide, dorsal concave, lateral reflexed; petals linear, apex fringed, 5–8 mm long, 1.5–3 mm wide; lip ovate, 9–11 mm long, 2–5 mm wide, conspicuously fringed; nectar spur slender, 3–4 cm long. Late July–mid-September. In wet *Sphagnum* bogs and savannas. Coastal Pine Meadows and Longleaf Pine Belt. Rare (NC, s to FL, w to MS and e TX; largely coastal). *Platanthera conspicua* in MS toward SW periphery of range. Global and state conservation status: G4G5; S2.



FIG. 5. Known distribution of *Platanthera clavellata* in Mississippi.

ated orchid species are *Isotria verticillata*, *Platanthera ciliaris*, *P. cristata*, and *Spiranthes cernuua*.

Representative specimens examined: **U.S.A. MISSISSIPPI. Choctaw Co.:** ca. 2.5 mi S of Tomnolen, deciduous woods around springhead and creek, 20 Jul 1978, Gordon 539 (MMNS). **Grenada Co.:** ca. 2.5 mi NNW of Gore Springs, (T22N, R6E, S12, S2), in springhead bog with much *Sphagnum*, associated with *Lobelia cardinalis*, *Chelone glabra*, *Eryngium integrifolium*, *Impatiens capensis*, *Gentiana saponaria*, *Platanthera ciliaris*, *Spiranthes cernuua*, 12 Jul 1985, Morris 400 (mwm, pers. herb. of Michael Wayne Morris); ca. 3 mi SE of Gore Springs, (T21N,



FIG. 6. *Platanthera conspicua*, Perry County, Mississippi.



FIG. 7. Known distribution of *Platanthera conspicua* in Mississippi.

Plants of *P. conspicua* appear to favor the ecotone between herb/sedge bogs and *Magnolia virginiana*—*Nyssa biflora*—*Persea palustris*—*Taxodium ascendens* communities along drainages through sites supporting this species. A population in Perry County within the DeSoto National Forest is associated with *Peltandra sagittifolia*.

Representative specimens examined: U.S.A. MISSISSIPPI. George Co.: ca. 5 mi S of Agricola School, 30.74583333, -88.49861111, large quaking bog in Dorovan-Johnston series soil, with Sphagnum, grass-

es, sedges dominating, 27 Aug 1981, Gordon 2706 (MMNS). Jackson Co.: ca. 4 mi NE of Pecan, 30.50555556, -88.40611111, disturbed hillside bog on edge of borrow pit, 25 Aug 1981, Gordon 2694 (MMNS); ca. 1 mi ENE of Pecan, 30.45167, -88.4025, pine savanna on edge of cypress drain and bayhead, 25 Aug 1981, Gordon 2671 (MMNS).

4. *Platanthera cristata* (Michx.) Lindl. (Figs. 8, 9). CRESTED FRINGED-ORCHID

Habenaria cristata (Michx.) R. Brown, *Orchis cristata* Michx., *Platanthera pallida* P.M. Brown.

Plant erect, to 60 cm tall. Leaves mostly basal, lanceolate, keeled, reduced and becoming bracts above, 12.5–25 cm long, 16–26 mm wide. Raceme cylindrical, densely (to loosely) flowered, bracteate, 2.5–9.5 cm long, 2.5–3.2 cm wide. Flowers 5–7 mm long, bright orange; dorsal sepal elliptic, concave, 4.5 mm long, 3.5 mm wide, lateral sepals orbicular, oblique, 4 mm long, 4 mm wide; petals obovate, apex broadly ciliate, 3 mm long, 1.5 mm wide; lip ovate, 4 mm long, conspicuously ciliate-fringed; nectar spur slender, 4–6(–10) mm long. Mid-Jul–mid-(late-)Aug. Open to shaded bogs and seepage slopes, springs, mossy stream banks, and wet areas along gas pipelines and powerline rights-of-way. Coastal Pine Meadows, Longleaf Pine Belt, North Central Plateau, Interior Flatwoods, and Tennessee River Hills. Rare to infrequent (MA s to c FL, w to AR and e TX; c TN). State conservation status: S3.



FIG. 8. *Platanthera cristata*, Rankin County, Mississippi.

treola petiolata, *Pluchea foetida*, *Polygala cruciata*, *P. mariana*, *Rhynchospora inexpansa*, and *Sophranthe pilosa*. In southern Mississippi, it is present at bases of seepage slopes and along springs and streams where there is usually a partially open canopy in the bay swamp community, among other places. In addition to common bay swamp species already mentioned, the following are known to occur with south Mississippi *P. cristata* populations: *Apteria aphylla*, *Clethra alnifolia*, *Cliftonia monophylla*, *Cyrilla racemiflora*, *Drosera intermedia*, *Dulichium arundinaceum*, *Hypericum galioides*, *Ilex amelanchier*, *Ilex myrtifolia*, *Illicium floridanum*, *Kalmia latifolia*, *Leucothoe axillaris*, *L. racemosa*, *Ludwigia pilosa*, *Pogonia ophioglossoides*, *Rhododendron viscosum*, *Smilax laurifolia*, and *Sparganium americanum*.



FIG. 9. Known distribution of *Platanthera cristata* in Mississippi.

Habitats supporting *P. cristata* populations in Mississippi are mostly intermediate between more open sites in which *P. ciliaris* is most often found and more shaded sites in which *P. clavellata* occurs; however, *P. cristata* may occur with both fringed orchid species (Morris 1997). In northern and central Mississippi, *P. cristata* often occupies the ecotone between shaded spring branches and more open grass/sedge meadows at the edges of beaver ponds or along powerline rights-of-way running through bay swamp communities. Here, associated species include many of those listed for *P. ciliaris*, along with the following taxa: *Aletris aurea*, *Bartonia paniculata*, *Carex glaucescens*, *Carex leptalea*, *Cyperus haspan*, *Drosera capillaris*, *Elephantopus nudatus*, *Eupatoriadelphus fistulosus*, *Fuirena squarrosa*, *Hydrolea ovata*, *Hypericum crux-andreae*, *Hypericum gymnanthum*, *Lechea minor*, *Lespedeza capitata*, *Liatris spicata*, *Ludwigia hirtella*, *Lycopodiella alopecuroides*, *Lyonia ligustrina*, *Mi-*



FIG. 10. Swamp forest habitat supporting populations of *Platanthera clavellata* and *Platanthera flava*, Grenada County, Mississippi.

Representative specimens examined: **U.S.A. MISSISSIPPI. George Co.:** ca 5 mi S of Agricola, quaking bog in Dorovan-Johnston Series soil, 23 Jul 1981, *Gordon* 2567 (MMNS). **Grenada Co.:** ca. 4.5 mi SSE of Gore Springs, (T21N, R7E, S8, E2), in bog at edge of beaver pond, 31 Jul 1986, *Morris* 2405 (IBE, mwm). **Jackson Co.:** Red Creek Mitigation Bank E of Hwy 57, 30.7092, -88.7222, roadside ditch in pine plantation uplands, 25 Jul 2006, *Sullivan* 06-1422 (MMNS). **Monroe Co.:** ca. 5 mi N of Aberdeen, (T14S, R7E, S3, SE4), near edge of woods by Acker Lake, 1 Aug 1995, *MacDonald* 9023 (MMNS). **Oktibbeha Co.:** ca. 0.5 mi N of Cedar Grove Rd., off Hwy 25, Noxubee National Wildlife Refuge, flatwoods, 19 Jul 1994, *Liedolf* 0526 (MMNS). **Perry Co.:** DeSoto National Forest, Leaf River Wildlife Management Area, bay swamp, scarce in peaty muck along stream, 19 Jul 1994, *Wyrick* 94-120 (MMNS). **Rankin Co.:** ca 16 mi SE of Brandon, in moist to wet flatwoods along a gas pipeline and adjacent to dry-mesic woods with scattered longleaf pines, co-occurring with *P. ciliaris*, 31 Jul 1995, *Morris* 4384 (IBE).

5. *Platanthera flava* (L.) Lindl. (Figs. 10–12). SOUTHERN REIN-ORCHID

Habenaria flava (L.) R. Brown, *Orchis flava* L., *Perularia scutellata* (Nutt.) Small

Plant erect, leafy, to 50 cm tall. Leaves mostly basal, lanceolate, reduced and becoming bracts above, 9–17 cm long, 20–50 mm wide. Spike loosely flowered, bracteate, 7–19.5 cm long, 10–18 mm wide. Flowers 2.5–6 mm long, yellow-green; dorsal sepal ovate, concave, 2–4 mm long, 2–3 mm wide, lateral sepals ovate, oblique, 2–4 mm long, 2–3 mm wide; petals ovate, concave, 2–4 mm long, 2–3 mm wide; lip ovate, rounded, the base with a triangular lobe on each side, 5 mm long, 4 mm wide; nectar spur 4–8 mm long, 1 mm wide. Jul–early Oct. Mucky depressions along streams in shaded forests, swampy hardwoods at bases of bluffs, and along braided streams in dense cypress—hardwood swamp forests. Coastal Pine Meadows, Longleaf Pine Belt, North Central Plateau, Loess Bluff/Yazoo-Mississippi Delta transition areas, Interior Flatwoods, Pontotoc Ridge, and Tennessee River Hills. Infrequent (NS to Ont. and MN, s to c FL, w to e TX and IA). *Platanthera flava* (L.) Lindl. var. *flava* in MS near central part of range.

Mosquitoes, the pollinating agents of *P. flava* (Luer 1975), abound where this orchid grows. Plants tend to grow along the banks of braided streams in colluvial swamp forests, in old stream channels filled with muck, and at the bases of large bald cypress trees. Although widespread in Mississippi, *P. flava* is not common. Associated species in a swamp forest located in the Loess Bluffs in close proximity to the Yazoo-Mississippi Delta in Grenada County are: *Acer rubrum*, *Asimina triloba*, *Carex bromoides*, *Carpinus caroliniana*, *Cicuta maculata*, *Cornus foemina*, *Dasistoma macrophyllum*, *Dryopteris x australis*, *Impatiens capensis*, *Itea virginica*, *Lindera*



FIG. 11. *Platanthera flava*, Lafayette County, Mississippi.



FIG. 12. Known distribution of *Platanthera flava* in Mississippi.

zoin, *Lobelia cardinalis*, *Osmunda regalis*, *Platanthera clavellata*, *Populus heterophylla*, *Rhynchospora miliacea*, *Rudbeckia fulgida*, *Sabal minor*, *Saururus cernuus*, *Solidago patula*, *Taxodium distichum*, and *Thelypteris palustris*.

Representative specimens examined: **U.S.A. MISSISSIPPI.** **Benton Co.:** swampy woods near Indian Creek, 10 Aug 1976, *Browne 76D3.17* (MMNS). **Chickasaw Co.:** along Chuquatonche Creek, frequent in wet soil in bottom of old stream in deciduous forest below bluff, 31 Jul 1980, *Gordon 2074* (MMNS). **Grenada Co.:** ca. 3 mi NW of Holcomb, (T22N, R3E, S7, W2), near small stream in boggy woods, 8 Jul 1986, *Morris 2262* (IBE, MMNS, mwm). **Panola Co.:** ca. 6 mi SSW of Batesville along Panola-Quitman Floodway, bottomland hardwood forest, 4 Aug 1980, *Pullen Pa2-88* (MMNS). **Pearl River Co.:** 30.925, -89.878, Hillsdale Rd. near railroad crossing, bay drain, 22 Sept 2004, *Sullivan 04-754* (MMNS). **Tishomingo Co.:** J.P. Coleman State Park, woods and borders along Pickwick Lake, 5 Oct 1978, *Rogers 46208* (MMNS).

6. *Platanthera integra* (Nutt.) A. Gray ex L.C. Beck (Figs. 13–15). YELLOW FRINGELESS-ORCHID

Habenaria integra (Nutt.) Spreng., *Orchis integra* Nutt.

Plant erect, to 65 cm tall. Leaves mostly basal, lanceolate, keeled, conduplicate, reduced and becoming bracts above, 5.5–19 cm long, 8–17 mm wide. Raceme cylindrical, densely flowered, bracteate, 3–6 cm long, 2.5–3 cm wide. Flowers 5–7 mm long, 5–6 mm wide, yellow-orange; sepals obovate to orbicular, dorsal sepal 4 mm long, 3 mm wide, concave, lateral sepals 5 mm long, 4 mm wide, oblique; petals elliptic, 4 mm long, 1.5 mm wide; lip oblong, rounded, 4–6 mm long, 3–4 mm wide, crenulate to rarely entire; nectar spur 4–6 mm long. Jul–mid-Sep. Open, wet savannas and hillside bogs. Coastal Pine Meadows and Longleaf Pine Belt. Rare (NJ and DE, NC to n FL, w to e TX; TN; primarily coastal). Global and state conservation status: **G3G4; S3.**



Fig. 13. Savanna habitat supporting populations of *Platanthera ciliaris* and *Platanthera integra*, Crosby Arboretum, Hancock County, Mississippi.

Platanthera integra is found in pine savannas, pitcher plant bogs, and just upslope from "quaking bogs" in the vicinity of natural ponds with floating mats of vegetation. Frequent fires, historically caused by lightning strikes, are critical to maintaining the open, park-like nature of suitable *P. integra* habitat. Vascular plant species growing in association with *P. integra* are those listed above that are also known to grow with *P. conspicua* and *P. nivea*.

Representative specimens examined: **U.S.A. MISSISSIPPI. George Co.:** ca. 5 mi S of Agricola School, 30.7458, -88.4986, large quaking bog in Dorovan-Johnston Series soil, 27 Aug 1981, *Gordon* 2716 (MMNS). **Hancock Co.:** Hillside Bog Natural Area of the Crosby Arboretum, pitcher plant bog, locally abundant, 4 Aug 1986, *Morris* 2422 (DSC, herbarium Crosby Arboretum). **Harrison Co.:** ca. 2 mi S of Landon, (T7S, R12W, S12), large quaking bog with floating mats of vegetation, 11 Aug 1981, *Gordon* 2657 (MMNS). **Jackson Co.:** ca. 2.6 mi SSW of Larue, (T5S, R9W, S23, SW4), DeSoto National Forest, pine savanna and bog, 11 Aug 1981, *Gordon* 2649 (MMNS).

7. *Platanthera integrilabia* (Correll) Luer (Figs. 16, 17). MONKEY-FACE

Habenaria blephariglottis (Willd.) Hook. var. *integrilabia* Correll, *H. correlliana* Cronq.

Plant erect, to 60 cm tall. Leaves mostly basal, elliptic to lanceolate, keeled, reduced and becoming bracts above, 20–23 cm long, 40–42 mm wide. Raceme loosely few- to many-flowered, bracteate, 6.5–7.5 cm long, 4–6.5 cm wide. Flowers 10–12 mm long, 9–10 mm wide, white; sepals suborbicular to broadly ovate, dorsal sepal 8 mm long, 6 mm wide, concave, lateral sepals 9 mm long, 7 mm wide, reflexed; petals oblong, entire, 7 mm long, 2.5 mm wide; lip spatulate-lanceolate, 13 mm long, 3 mm wide, margin serrulate; nectar spur slender, curved, 3.5–4 cm long. Aug. Shaded spring branches and bogs in dense woods. Tennessee River Hills. Rare (sw NC to KY, s to n GA, AL, and ne MS). *Platanthera integrilabia* at SW periphery of range in MS. Global and state conservation status: **G2G3, S1**.



FIG. 14. *Platanthera integra*, Hancock County, Mississippi.

cm long, 12–15 mm wide. Raceme mostly laxly flowered, bracteate, 7.5–14 cm long, 4–4.5 cm wide. Flowers 17–19 mm long, 7–10 mm wide, greenish; sepals ovate to oblong, dorsal sepal 4–7 mm long, 3–5 mm wide, lateral sepals 4–8 mm long, 3–4 mm wide, spreading; petals linear-oblong, sometimes denticulate, 5–8 mm long, 2 mm wide; lip tripartite and further divided into filiform segments, 10–12(–17) mm; nectar spur slender,



FIG. 15. Known distribution of *Platanthera integra* in Mississippi.

Extant populations of *P. integrilabia* in Mississippi are in Itawamba and Tishomingo counties. Plants occur with *Acer rubrum*, *Athyrium filix-femina*, *Carex leptalea*, *Liriodendron tulipifera*, *Magnolia virginiana*, *Oxydendrum arboreum*, *Photinia pyrifolia*, *Platanthera cristata*, *Prunus serotina*, *Rhododendron arborescens*, *Woodwardia areolata*, and *Xanthorhiza simplicissima* near the headwaters of a stream at a Tishomingo County site. Several historical Mississippi populations from elsewhere in the Tennessee River Hills have been extirpated due to flooding associated with the construction of dams to form lakes for erosion control and recreational purposes.

Representative specimens examined: U.S.A. MISSISSIPPI. Tishomingo Co.: ca. 1.5 mi NE of Paden, 34.6688, -88.2433, seepage bogs draining into Pollard Mill Branch, 23 Aug 1995, Herring s.n. (MMNS).

8. *Platanthera lacera* (Michx.) G. Don (Figs. 18, 19). RAGGED FRINGED-ORCHID, GREEN FRINGED-ORCHID

Habenaria lacera (Michx.) R. Brown, *Orchis lacera* Michx.

Plant erect, to 50 cm tall. Leaves mostly basal, elliptic to lanceolate, keeled, reduced and becoming bracts above, 6.5–11



FIG. 16. *Platanthera integrilabia*, originally from Tishomingo County, Mississippi; in garden in Hinds County, Mississippi.

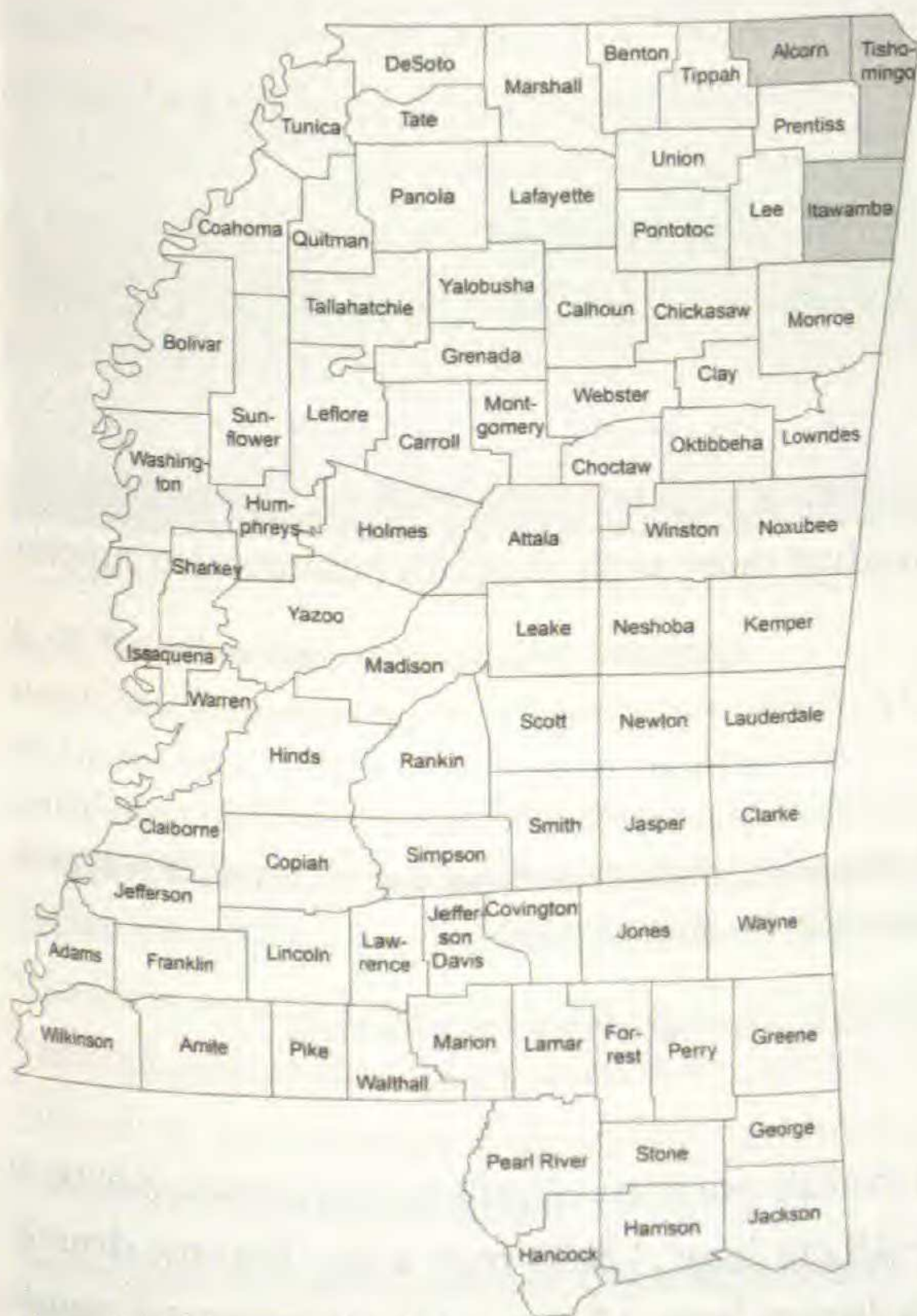


FIG. 17. Known distribution of *Platanthera integrilabia* in Mississippi.

curved, club-shaped, 1.2 cm long. Mid-May–Jun. Mesic field/woodland ecotones, hardwoods along creeks, and roadside ditches. Longleaf Pine Belt, North Central Plateau, and Tennessee River Hills. Rare (Nfld. to Man., s to c GA, AL, w to ne TX, e OK, and e KS). *Platanthera lacera* at southern periphery of range in MS. State conservation status: **S1S2**.

In Grenada County, *P. lacera* occurs in a rich deciduous woods/pasture ecotone with the following vascular plant species: *Acer rubrum*, *Aesculus pavia*, *Arisaema dracontium*, *Carpinus caroliniana*, *Carya cordiformis*, *Corylus americana*, *Juglans nigra*, *Liriodendron tulipifera*, *Lobelia cardinalis*, *Ostrya virginiana*, *Prunus serotina*, *Quercus rubra*, and *Thalictrum pubescens*. The orchid species *Listera australis*, *Spiranthes lacera* var. *gracilis*, and *S. ovalis* are in close proximity. In Mississippi, it is difficult to search for new populations of *P. lacera*, due to the fact that it is hard to characterize a consistent habitat type for the species.

Representative specimens examined: **U.S.A. MISSISSIPPI. Grenada Co.:** ca. 2.5 mi NNW of Gore Springs, (T22N, R6E, S12, W2), at rich deciduous woods/pasture ecotone, rare, 19 May 1986, *Morris* 996 (mwm, pers. herb. of Michael Wayne Morris); (T21N, R6E, S11, NW4), Camp McCain, low bottomland hardwoods, rare, 31 May 1996, *MacDonald* 9485 (MMNS). **Webster Co.:** 33.4672, -89.4633, roadside ditch, 1 Jun 1980, *Herring* s.n. (MMNS).

9. *Platanthera nivea* (Nutt.) Luer (Figs. 20, 21). SNOWY ORCHID

Habenaria nivea (Nutt.) Spreng., *Orchis nivea* Nutt.

Plant erect, to 70 cm tall. Leaves mostly basal, lanceolate, keeled, conduplicate, reduced and becoming bracts above, 15–26 cm long, 10–15 mm wide. Raceme cylindrical, densely flowered, bracteate, 6–7 cm long, 2–2.5 cm wide. Flowers non-resupinate (lip uppermost), 8 mm long, 5 mm wide, pure white; sepals ovate to oblong, middle sepal 5 mm long, 3 mm wide, lateral sepals 6 mm long, 2.5 mm wide; petals oblong, dilated at base, 5 mm long, 2 mm wide; lip linear-elliptic, 6 mm long, 2 mm wide; nectar spur slender, straight, 14–15 mm long. Jun–Jul(–early Aug). Open savannas, shrub bogs, and rarely highway medians and rights-of-way. Coastal Pine Meadows, Longleaf Pine Belt, historically and very



FIG. 18. *Platanthera lacera*, herbarium specimen in Riker Mount from Grenada County, Mississippi.



FIG. 19. Known distribution of *Platanthera lacera* in Mississippi.

transition areas between moist to wet savannas and the surrounding more xeric sandhill habitats also supporting *Pinus palustris*, *Ilex glabra*, and *Serenoa repens*.

Representative specimens examined: **U.S.A. MISSISSIPPI. Hancock Co.:** ca. 8 mi E of Picayune along Hwy 43, sphagnum bog with *Drosera*, *Xyris*, *Rhynchospora*, *Eriocaulon*, *Sabatia*, *Taxodium*, 7 Aug 1980, Gordon 2141 (MMNS). **Jackson Co.:** ca. 1 mi W of MS/AL state line on S side of US Hwy. 90, (T7S, R4W, S5), savanna, Bayboro soils, infrequent in drain, 7 Jun 1983, Norquist 1095 (MMNS); ca. 3 mi SE of Ocean Springs, Sandhill Crane National Wildlife Refuge, (T7S, R5W, S31), savanna, 8 Jul 1983, Norquist 1213 (MMNS). **Stone Co.:** ca. 14 mi E of Perkinston, University Forest Lands Headquarters, pinelands and pitcher plant bogs, 28 Jun 1968, Temple 9529 (MMNS).

10. *Platanthera peramoena* A. Gray (Figs. 22, 23). PURPLE FRINGELESS-ORCHID, PRIDE-OF-THE-PEAK

Habenaria peramoena A. Gray, *Platanthera fissa* Lindl.

Plant erect, to 100 cm tall. Leaves distributed along basal and middle portions of inflorescence axis, elliptic to lanceolate, keeled, reduced and becoming bracts above, 8.5–18 cm long, 12–33 mm wide. Raceme densely flowered, bracteate, 6.5–20 cm long, 5.5–7.5 cm wide. Flowers 20 mm long, 12 mm wide, violet-purple; sepals elliptic, dorsal sepal 5–9 mm long, 4–7 mm wide, lateral sepals 6–9 mm long, 4–7 mm wide, reflexed; petals

rarely from the southern North Central Plateau. Infrequent (NJ and DE, NC to FL, w to se TX and s AR; largely coastal).

Unusual among the genus in the southeastern United States, *P. nivea* positions its flowers so that the lip is uppermost; all other *Platanthera* species in Mississippi have the lip, or labellum, in the lowermost position on each flower. This species needs open, park-like habitats maintained by low-intensity fires at regular intervals. In terms of soil moisture, *P. nivea* can occur in the



FIG. 20. *Platanthera nivea*, Jackson County, Mississippi.



FIG. 21. Known distribution of *Platanthera nivea* in Mississippi.

spatulate to oblong-linear, denticulate, 4–8 mm long, 3–6 mm wide; lip tripartite, narrowed at base, cuneate, middle lobe with central notch, 15 mm long, 12 mm wide; nectar spur slender, club-shaped, curved, 22–25 mm long. Late June–mid-July. Bottomland hardwoods and adjacent meadows in creek and river floodplains, overgrown pastures, and grassy ditch/pine plantation ecotones. Longleaf Pine Belt/Jackson Prairie transition areas, Jackson Prairie, North Central Plateau, Loess Bluffs, Pontotoc Ridge, and Tennessee River Hills. Rare (NJ and PA to s IL and s MO, s to n GA, n AL, c MS, and n AR). *Platanthera peramoena* at SW periphery of range in MS. State conservation status: **S2S3**.

A spectacular plant, *P. peramoena* sporadically occurs in northern and central Mississippi. The habitat

in Attala County is a rich deciduous hardwood forest along a creek. Associated species there are the following: *Acer floridanum*, *Arisaema dracontium*, *A. triphyllum*, *Diospyros virginiana*, *Ilex opaca*, *Lilium superbum*, *Liquidambar styraciflua*, *Quercus michauxii*, *Q. pagoda*, and *Q. shumardii*. In a Loess Bluffs/North Central Plateau transition area in Grenada County, *P. peramoena* is in a wet meadow/bottomland hardwoods ecotone in the Yalobusha River floodplain with *Acer rubrum*, *Fraxinus pennsylvanica*, and *Salix nigra*. As with *P. lacera*, it is difficult to determine specific habitat requirements for *P. peramoena*. Sites supporting populations of this rare species are often nondescript.

Representative specimens examined: **U.S.A. MISSISSIPPI. Attala Co.:** ca. 1.2 mi ENE of Possumneck, on E side of Sharkey Creek, 17 Jul 1997, Hackett s.n. (MMNS). **Grenada Co.:** ca. 1.5 mi NNW of Grenada, (T22N, R5E, S6, NW4), low woods/wet meadow ecotone in Yalobusha River floodplain, 8 Jul 1986, Morris 2269 (mwm), 3 Jul 1987, Morris 2913 (IBE). **Jasper Co.:** ca. 6.4 mi on FS 507 from junction with Hwy. 15,



FIG. 22. *Platanthera peramoena*, Lafayette County, Mississippi.

Sullivan. Additional input from Mac Alford is appreciated. Thanks to John Gwaltney for digital images of *Platanthera conspicua*, *P. flava*, *P. integrilabia*, *P. nivea*, and *P. peramoena*. Additionally, I am grateful to Robert Stewart and my daughter, Melissa Morris, for accompanying me on several field trips in search of *Platanthera* species. Sam Faulkner is acknowledged for his assistance. Special thanks to Wayne and Lynda Edwards, and Robert and Sherry Morris for their assistance with this project. I gratefully acknowledge Heather Sullivan, Barney Lipscomb, and one anonymous reviewer for their helpful comments and suggestions. Appreciation is extended to Julie Barbaree, Murray Hyde, and Glenn Cohen, Department of Biological and Environmental Sciences, Troy University, for technical assistance. This research was partially supported by a Troy University Faculty Development Summer Research Grant.



FIG. 23. Known distribution of *Platanthera peramoena* in Mississippi.

32.1944, -89.2827, maintained roadside on W side of road, 5 Jul 2004, Sullivan 04-627 (MMNS). **Lafayette Co.:** shady, sandy swamp, 8 Jul 1916, Bailey s.n. (MISS); vicinity of Puskus Creek in Holly Springs National Forest, wet deciduous woods, 20 Jul 1965, Pullen 65242 (MISS). **Marshall Co.:** ca. 3 mi N of Lafayette-Marshall county line, state hwy. 7, low woods, 28 Jun 1968, Temple 9529 (MMNS). **Montgomery Co.:** ca. 6.7 mi SE of Winona, weedy overgrown fields and edges of woods, 3 Jul 1982, Herring s.n. (MMNS).

ACKNOWLEDGMENTS

Curators of the following herbaria are gratefully acknowledged: DSC, IBE, MISS, MISSA, MMNS, USMS, and The Crosby Arboretum. Data from the Mississippi Natural Heritage Program were provided by Heather

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